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A Comparative Study of Artificial Intelligence Governance Patterns in Selected Countries

Mahdi Abedipour¹, **Seyedabed Rezaei^{2*}**, **Seyedali Mousavi³**

1. Ph.D. student, Faculty of Management, Imam Hossein University, Iran

2. Associate Professor, Faculty of Management, Imam Hossein University, Iran

3. Associate Professor, Faculty of Management, Imam Hossein University, Iran

Corresponding author: Seyedabed@gmail.com

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ABSTRACT

This study employs a comparative qualitative approach to analyze AI governance patterns in seven countries (Iran, the US, China, the EU, the UK, Japan, and Singapore). Data from official documents and academic sources were analyzed across five dimensions: policy focus, regulatory approach, ethical principles, technological infrastructure, and international cooperation. The findings identify three dominant patterns: 1) State-centered (China, Singapore), emphasizing central control and large-scale investment; 2) Market-based (US), relying on decentralized innovation and voluntary standards; and 3) Participatory-rights-based (EU, UK), featuring a risk-based approach with a focus on transparency and algorithmic justice. Japan focuses on solving social challenges through voluntary innovation. Despite institutional advances, Iran faces obstacles such as sanctions and structural inconsistencies. The conclusion underscores the need for a hybrid model tailored to Iran, integrating the EU's risk-based approach, Singapore's institutional coordination, and the localization of Islamic values. Policy recommendations include developing binding ethical codes, committing to long-term investment in indigenous infrastructure, and leading regional coalitions.

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1. Introduction

In today's digital age, artificial intelligence (AI) has emerged as a driver of economic and social transformation and a sensitive arena for geopolitical and ethical competition. AI governance, as a framework for balancing innovation and risk, has become a key priority for leading countries, with the United States emphasizing market orientation, China emphasizing central control, and the European Union emphasizing human rights. By formulating comprehensive national strategies, advanced legal-ethical frameworks, and massive investments in research and development, these countries are aligning AI development with the management of social, security, and economic risk. By emphasizing ethical aspects and social responsibility, they advance innovation while avoiding negative consequences, such as algorithmic discrimination or privacy violations. International collaboration and effective engagement between the government, private sector, and civil society are also key success factors, as highlighted by reports such as the Stanford AI Index, OECD AI Policy Observatory, Oxford Government AI Readiness Index, and World Economic Forum's Governance Framework. These reports have introduced key criteria, such as digital infrastructure, innovation, and institutional readiness, to rank countries. In 2025, global competition over AI standards will intensify, making it even more urgent for developing countries like Iran, which faces sanctions and access inequalities, to localize its AI governance. This study adopts a comparative approach to the models of seven selected countries, explores the challenges and opportunities for Iran, and proposes solutions for aligning innovation with national values and social sustainability. Therefore, the criteria for classifying countries as "leaders" in AI governance are as follows:

1. National strategies and ongoing monitoring: Developing comprehensive policies with independent institutions to assess and regulate areas such as workforce training and cyber security ([OECD, 2025](#)).
2. Leadership in technology and innovation: Creating accelerator centers and supporting key applications, such as natural language processing and robotics, with public-private partnerships ([Committee, 2025](#)).
3. Adaptive legal-ethical frameworks: Dynamic laws focusing on transparency, accountability, and human rights protection, along with academic collaboration for new standards ([Forum, 2025](#); [Intelligence, 2019](#)).
4. Large-scale investment in research and development: Allocating public and private funding for academic and commercialization projects, with an emphasis on international collaborations ([Insights, 2025](#)).
5. Global impact and partnerships: An active role in international forums to shape shared policies on the safety and ethics of AI ([J. Yu, 2025](#)).
6. Focus on socio-economic development and accountability: Integrating AI to solve challenges such as climate change and public welfare, with public education and ethical policies for the equitable distribution of benefits ([UNESCO, 2024](#)).

These criteria, based on global indicators, assess countries as role models and form the basis for the comparative analysis in this study.

2. Methods

This study adopts a qualitative comparative approach to investigate AI governance patterns across seven countries: Iran, the United States, China, the European Union, the United Kingdom, Japan, and Singapore. The methodological foundation draws on the principles of comparative politics (Lijphart, 1971) and technology governance frameworks (Foss, 2007). This approach is particularly well-suited for identifying similarities and differences in political, institutional, and cultural contexts, as it accounts for contextual variables (e.g., geopolitics) and uncovers causal patterns through systematic case comparisons (Ragin).

2.1. Research Design and Case Selection

A key strength of this methodology is its ability to evaluate outcomes and explore the influence of specific arrangements or variables across different cases (Wang & Zhao, 2018). It employs a "most similar systems design" (MSSD) strategy, which controls for structural similarities (e.g., shared emphases on national security and economic innovation) while illuminating policy divergences (e.g., the EU's risk-based approach versus China's centralized control). This method is efficient for modest sample sizes ($n = 4-10$) and supports theoretical generalization (Eisenhardt, 1989).

Case selection followed a systematic process, integrating quantitative and qualitative criteria: (1) scores exceeding 70/100 on the Government AI Readiness Index (Insights, 2025); (2) institutional-geographic diversity (e.g., democratic systems such as the US and UK, authoritarian regimes such as China, and participatory models such as Singapore); and (3) representation of prevailing AI governance patterns as outlined by Stanford HAI (2025), including state-centric (China, Singapore), market-driven (US), and rights-based (EU) models. Iran was included as a representative "developing case with geopolitical constraints" (e.g., sanctions) to address the underrepresented perspectives from the Global South. The sample size ($n = 7$) conforms to Eisenhardt's (1989) guidelines for theory-building in case studies. Table 1 summarizes the case selection process.

Table 1.
Summary of Case Selection.

Country	AI Readiness Score (Oxford Insights, 2025)	Dominant Pattern	Selection Rationale
United States	85/100	Market-Driven	Global Innovation Leadership
China	82/100	State-Centric	Centralized Control & Massive Investment
European Union	80/100	Rights-Based	Comprehensive Risk Regulation
United Kingdom	78/100	Participatory-Innovation	Balance of Innovation & Oversight
Japan	76/100	Society-Centric	Addressing Social Challenges
Singapore	75/100	State-Centric Participatory	Experimental Asian Model
Iran	65/100	Development-Oriented	Indigenous Geopolitical Challenges

2.2. Data Collection

The data were sourced exclusively from secondary materials, including official documents and reports. The search protocol entailed querying databases such as Google Scholar, the OECD Library, Eur-Lex, and national government websites with the keyword combination "AI

governance + [country] + policy" (spanning January 2018 to November 2025). This yielded 350 initial documents, of which 120 were retained (totaling approximately 800 pages) based on the criteria of official or peer-reviewed status and alignment with the five key analytical dimensions. Zotero facilitated reference management.

Triangulation was implemented across three source types: policy documents (55%), international reports (35%), and scholarly articles (10%). Research highlights that Iran actively constructs a counter-narrative in its political discourse to challenge Western hegemony and what it perceives as hostile international pressure ([Shazia Akbar Ghilzai, 2025](#)). Primary data (e.g., interviews) were not collected, given the emphasis on policy-oriented analysis.

2.3. Analytical Framework and Analysis Method

The analytical framework centers on five core dimensions—policy focus, regulatory approach, ethical principles, technological infrastructure, and international cooperation—adapted from White et al. (2024). The analysis integrated: (1) thematic analysis ([Braun & Clarke, 2006](#)), involving a three-stage coding process (open coding: 45 initial codes; axial coding: 18 themes; selective coding: 5 dimensions) conducted in NVivo 14; and (2) the methodology described refers to Qualitative Comparative Analysis (QCA), a research technique formalized by Charles C. Ragin in his 1987 book, *The Comparative Method: Moving Beyond Qualitative and Quantitative Strategies* ([Marx et al., 2014](#)). The output includes a comparative matrix (Table 8) that maps the contextual factors to the policy outcomes. This process was iterative and continued until conceptual saturation was achieved ([Eisenhardt, 1989](#)).

2.4. Validity, Reliability, and Limitations

The framework described refers to the foundational criteria for ensuring trustworthiness in qualitative research, established by Lincoln and Guba in their 1985 work, *Naturalistic Inquiry* (Lincoln, 1985) (Lincoln, 1985b). This model was proposed as a qualitative alternative to the traditional quantitative metrics of validity and reliability, arguing that the goals of qualitative inquiry are different and require their own standards of rigor. The inter-coder reliability reached 92% ([Lincoln Y, 2000](#)).

Limitations include: (1) the absence of primary data, which constrains insights into policy implementation; (2) potential shifts in the post-2025 policy landscape; and (3) linguistic biases favoring English and Chinese sources (with Persian comprising only 20%). These limitations can be mitigated through recommendations for future longitudinal research. Overall, this methodology provides a robust qualitative foundation for addressing the study's research questions regarding governance patterns, priorities, and Iran's positioning.

3. Results

In the competitive landscape of AI governance, distinct global patterns have emerged, from China's centralized control and Singapore's strategic blueprint to the United States' dynamic innovation ecosystem and the European Union's risk-oriented framework. Yet, amid sanctions and

institutional challenges, what trajectory is Iran pursuing? This comparative analysis uncovers three dominant models and recommends a hybrid adaptation to foster indigenous progress.

3.1. Islamic Republic of Iran

In recent years, Iran has reevaluated its macro-level policies, positioning artificial intelligence (AI) as a pivotal factor in the global transformation. The National Artificial Intelligence Document, approved in 1403 (2024), serves as the cornerstone of the strategic framework. It aims to position Iran as a regional AI hub in West Asia, elevate AI's contribution to the economy to 5% of GDP by 1410 (2031), and enhance the quality of life ([Revolution, 2024](#)). In Iran, the development of artificial intelligence is framed as a matter of national sovereignty and a strategic response to economic isolation. The Iranian government promotes a narrative of AI as a symbol of national success and a critical tool for countering sanctions and securing national interests ([Atwood, 2025](#)). This approach is consistent with Iran's history of treating sanctions as an opportunity to develop indigenous capabilities in critical sectors ([Borszik, 2016](#)). However, this national narrative of technological sovereignty can obscure the material and practical challenges of implementing AI, which is often entangled with global practices and vulnerabilities ([Atwood, 2025](#)).

Institutionally, key entities include the Supreme Council of the Cultural Revolution (as the upstream policymaking body), the National Strategic Council for Artificial Intelligence (for executive coordination), and the National Organization for Artificial Intelligence (for operational implementation). The bill establishing the "National Organization for Artificial Intelligence of Iran" was approved in 2025 and placed under the President's Office for supervision, thereby formalizing its structure ([Revolution, 2024](#)).

A primary challenge identified in Iran's governance structure is the lack of coordination and coherence between different bodies. A 2025 study of Iran's administrative system identified "internal coordination" and "external coordination" as major sources of policy incoherence ([Karimi, 2025](#)). This fragmentation is echoed in research on AI implementation, with one study on Iran's health sector pointing to "fragmented governance" as a key structural barrier to AI adoption ([Behzadifar, 2025](#)). This lack of synergy undermines the effective execution of national strategies, including those related to technology and AI ([Karimi, 2025](#)).

Prior to this document's release, Iran had achieved incremental advances through upstream policies, such as the National Information and Communication Technology Development Policy, which addressed aspects of smartization, infrastructure expansion, and e-government initiatives. However, these earlier frameworks lacked a dedicated focus on AI and suffered from coordination deficiencies, which were their key shortcomings. In summary, Iran has made significant strides toward formalizing technology governance through the National AI Document. However, to fully realize its potential, the framework requires enhanced institutional capacity, greater regulatory transparency, and broader stakeholder engagement.

Table 2.
Iran's AI Governance: Key Categories and Strategic Measures.

Categories	Key Action
Strategic Documents	National AI Document (2024): The regional hub aims to increase the share of AI in GDP to 5% by 2020; focus on G5 infrastructure and training of specialized personnel.

Legislation	Establishment of the National AI Organization: Under the supervision of the presidency, with an emphasis on preventing monopolies and supporting open source projects.
Ethical Framework	Indigenous principles with Islamic values (justice, human dignity); limited to basic guidelines, need for a binding charter.
Infrastructure and Investment	\$15.6 million budget from the National Development Fund for localization and the National Information Network; the challenge of sanctions.
Cooperation	In recent years, Iran has reevaluated its foreign policy to prioritize relations with neighboring states and pursue "multilateral economic integration.

3.2. United States of America

The United States' approach to Artificial Intelligence governance is characterized by market-driven innovation, minimal regulatory constraints, and a decentralized, multi-stakeholder framework ([Daniels et al.](#); [Kulothungan & Gupta, 2025](#)). This approach prioritizes sustaining global leadership in technological innovation while addressing security, ethical, and social challenges ([Ashraf, 2025](#)). This reflects the federal structure of the country and the significant influence of non-state actors.

3.2.1. Macro-Strategic Documents

The United States has established a cohesive national policy for Artificial Intelligence (AI) governance, marked by key initiatives such as the American AI Initiative and the National Artificial Intelligence Research and Development Strategic Plan ([Bal & Gill, 2020](#); [Gursoy & Kakadiaris, 2023](#)). This approach reflects a commitment to sustaining global leadership in technological innovation while addressing the associated security, ethical, and societal challenges ([Ashraf, 2025](#)).

In February 2019, the launch of the American AI Initiative by the White House signaled a significant step in this direction, resting on four primary pillars:

- Bolstering investments in research and development (R&D): The US approach, as highlighted by initiatives such as the National AI Research Institutes program, emphasizes funding basic R&D and strengthening connections between business and AI-related research ([Donlon, 2024](#)).
- Cultivating human capital and skills: Acknowledging that over half of the AI talent in the US is foreign-born, immigration policies are a central component of this strategy ([Bal & Gill, 2020](#)).
- Fostering technological advancements through public-private partnerships: This pillar aims to leverage collaboration between the government and private sectors to drive innovation.
- Establishing national guidelines for the safe and ethical deployment of AI: This involves developing frameworks to ensure that AI systems are transparent, accountable, and trustworthy.

In 2025, the United States introduced its AI Action Plan, which outlined three core objectives aimed at solidifying its position in the global AI landscape ([Office of & Technology, 2025](#)). This plan marks a strategic shift from a rights-centered framework, such as the 2022 Blueprint for an AI Bill of Rights, to a more competitive and innovation-focused paradigm ([Belikova, 2025](#)).

The three core objectives of the 2025 U.S. AI Action Plan are:

- **Achieving global dominance via a secure computing infrastructure:** This objective emphasizes securing a leading position in AI globally, a national security imperative for the United States ([Office of & Technology, 2025](#)). This involves accelerating innovation, integrating technologies into various sectors, and implementing AI safety measures. Efforts include modernizing power grids, revitalizing semiconductor manufacturing, enhancing cybersecurity, and expanding American technology exports to allies while countering rival influences ([Belikova, 2025](#)). The Department of Defense and the National Institute of Standards and Technology are likely involved in overseeing this aspect, particularly concerning secure computing infrastructure.
- **Promoting ideological neutrality:** This objective may relate to executive orders and policies aimed at "procurement neutrality" or preventing "Woke AI in the Federal Government" ([Belikova, 2025](#); [Lo, 2025](#)).
- **Enhancing workforce skills for AI-related infrastructure:** Recognizing the significant shift towards automated and data-driven workplaces, the plan addresses the need to prepare the workforce with adequate AI competencies. This includes upskilling initiatives and fostering technical competencies, such as prompt engineering, across federal, state, corporate, and educational domains. The goal is to ensure workforce readiness for an AI-driven economy, encompassing roles such as HVAC technicians ([Joshi, 2025](#); [Shi, 2025](#)).

3.2.2. Legislation and Regulation

While comprehensive federal legislation on Artificial Intelligence remains absent in the United States, regulatory efforts constitute a central pillar of its AI governance strategy ([DePaula et al., 2025](#)). The U.S. approach employs various sector-specific regulations rather than a single overarching framework, with states increasingly passing their own AI-related legislation ([Al-Shawabkeh & Al-Jasmi, 2025](#)).

3.2.3. Ethical and Legal Frameworks

The Blueprint for an AI Bill of Rights, released by the White House in October 2022, outlines five foundational principles for the ethical governance of artificial intelligence systems: ensuring system safety and effectiveness, safeguarding against algorithmic discrimination, protecting data privacy, providing notice and explanation about AI systems, and mandating human alternatives, consideration, and fallback ([Lage et al., 2024](#)). This framework aims to guide the design, use, and deployment of automated systems to protect public rights and align with democratic values ([Blumenthal-Barby, 2023](#)).

3.2.4. Investment and Capacity Building

The U.S. strategy for advancing artificial intelligence is significantly bolstered by substantial investments in research and development, prominently featuring the National Science Foundation's (NSF) AI Research Institutes program ([Donlon, 2024](#)). This program, which began funding academic hubs in 2020, addresses grand societal challenges through both foundational and use-inspired AI research, acting as a nexus point for interdisciplinary collaborations ([Donlon & Goel, 2023](#)). These institutes specialize in diverse domains, such as explainable AI, precision agriculture, and cyber-physical systems ([Adve et al., 2025](#); [McGovern et al., 2022](#)).

3.2.5. National Security and Defense Applications

AI occupies a pivotal position in the U.S. national security doctrine. The Department of Defense's Artificial Intelligence Strategy and National Security Memorandum prioritize enhancements to defense capabilities, protective technologies, and countermeasures. The U.S. national security doctrine places artificial intelligence in a central role, with the Department of Defense's (DoD) Artificial Intelligence Strategy and National Security Memorandum emphasizing enhancements to defense capabilities and protective technologies. AI is viewed as transformative for national security and international relations, impacting military systems, cybersecurity, intelligence, and diplomatic strategy, thereby redefining how states perceive and react to security threats ([Khan, 2025](#)).

3.2.6. Multi-Actor Governance and the Role of Technology Companies

The governance architecture for artificial intelligence (AI) is characterized by a decentralized, multi-actor paradigm involving both federal entities and major technology firms, along with global standards bodies ([Adebola et al., 2024](#); [Jobin et al., 2019](#)).

3.2.7. International Cooperation

The United States actively participates in collaborative regulation through its affiliations with international bodies such as the G7 and the Organisation for Economic Co-operation and Development (OECD) to advance shared frameworks, best practices, and harmonize standards in artificial intelligence ([Davtyan, 2024](#); [Habuka & Socol de la Osa, 2025](#)).

Table 3.

AI Governance in the USA: Key Categories and Strategic Measures.

Categories	Key Action
Strategic Documents	National AI Initiative (2019): 4 pillars of research, people, collaboration, safety; National R&D Strategy (2019); Roadmap (2025): Infrastructure Mastery, Non-Binance, Workforce Skills.
Legislation	AI in Government Act: Government Center and Transparency; Congressional Bills for Privacy and Discrimination.
Ethical Frameworks	AI Human Rights Plan: 5 principles (safety, privacy, transparency, fairness, human oversight).
Investment and Capacity Building	AI Research Institutes (from 2020): Focus on smart agriculture and cyber-physical systems; - Data sharing and university-industry collaboration.

National Security and Defense	AI and National Security Strategy: Strengthening Defense and Cyberwarfare (DoD).
Multi-Actor Governance	Role of OSTP, NSF, NIST, FTC; Large corporations (Google, etc.) in OECD, IEEE, ISO standards.
International Cooperation	Membership in OECD, G7, GPAI; Promoting democratic values and transparency.

3.3. People’s Republic of China

The People's Republic of China has adopted an ambitious and strategic approach to artificial intelligence, aiming to become a world leader in this field by 2030 ([Roberts et al., 2021](#)). This state-driven model prioritizes rapid AI deployment, national security, and economic growth, often balancing these factors with societal transformation and ideological goals ([Arora et al., 2025](#)). The country employs AI as a tool for public service improvement and to strengthen its authoritarian governance through extensive surveillance, big data analysis, and predictive technologies, raising concerns about digital authoritarianism and privacy ([Zeng, 2020](#)).

3.3.1. National Strategic Documents and Vision

China's "Next Generation Artificial Intelligence Development Plan," issued in July 2017, aims to establish China as a global innovation center in artificial intelligence by 2030 ([Abbas & Amin, 2025](#)). The plan sets a target of 1 trillion renminbi for China's core AI industry and 10 trillion renminbi for related industries by 2030 ([Oxford, 2018](#)).

In 2025, the Global AI Governance Action Plan was unveiled at the World AI Conference in Shanghai. This initiative, which proposes a "world AI cooperation organization," is a response to the cross-border risks associated with artificial intelligence. More than 1,000 delegates from 40 countries endorsed this plan ([Z. Yu, 2025](#)). The plan, launched by China, involves UN-centered cooperation, standards work, and capacity-building efforts ([Lo, 2025](#)). The competition for AI dominance has become a fundamental aspect of global politics, with China and the United States engaged in a rivalry over technological supremacy ([Haider et al., 2025](#)). The US approach shifted from engagement to competition, with both nations vying for military, industrial, and digital network leadership ([Mori, 2019](#)). China's rapid adoption of AI policies and significant investment in research and development are seen as factors that could shift global competition, potentially challenging the US’s current leadership. Despite tight government control and financial support, China faces challenges in fully developing its high-tech AI industry; however, its leaders are working to overcome these challenges to strengthen the position of Chinese companies ([Strukova, 2020](#)).

3.3.2. Legal Regulation and Data Protection

The provided sources discuss China's Personal Information Protection Law (PIPL) and Cybersecurity Law, often in comparison to international data protection frameworks such as the GDPR ([Lim & Oh, 2025](#); [Umitchinova et al., 2025](#)).

However, the retrieved publications do not contain specific information regarding the 2025 amendments to the Cybersecurity Law, which introduced mandatory 24-hour reporting for AI

incidents, new rules for AI content labeling to identify deepfakes and fabricated videos, or the draft AI safety standards framework delineating security risk evaluations with fines of up to 4% of global revenue. While some papers touch upon AI regulation in China, they do not detail these particular developments ([Joni Laksito, 2025](#)).

3.3.3. Ethical Principles and Soft-Legal Frameworks

The provided sources discuss various aspects of China's ethical principles and governance frameworks for Artificial Intelligence ([Bean et al., 2025](#); [Daly et al., 2019](#)). These discussions often highlight principles such as transparency, accountability, fairness, and privacy in AI applications ([Jobin et al., 2019](#)). China's approach to AI ethics is also compared with international frameworks, revealing both commonalities and distinct normative approaches shaped by different philosophical traditions and cultural heritages ([Fung & Etienne, 2023](#)). Some studies also touch upon the regulation of AI in specific sectors, such as e-commerce and financial institutions, emphasizing the importance of ethical guidelines and governance structures. ([Mai et al., 2024](#))

3.3.4. Enforcement Bodies and Institutional Structure

The provided scientific publications discuss the broader landscape of Artificial Intelligence governance in China, often highlighting the country's approach to regulation and ethical principles ([Shi, 2023](#)). These sources touch upon the involvement of various governmental and academic entities in shaping AI policy and development ([Yang et al., 2025](#)). For instance, discussions include the establishment of multi-agent governance systems and the formulation of ethical guidelines and regulatory frameworks for AI ([Jia, 2023](#)).

3.3.5. Innovation Ecosystem and Private Sector Participation

China's approach to Artificial Intelligence development is characterized by significant government support and strategic initiatives that foster collaboration between the state and the private sector. The government actively promotes AI technological self-reliance and industrial growth through strategies such as 'AI+ Industry' and substantial national investment funds (Lee, 2025). The private sector capitalizes on favorable political conditions to rapidly develop AI applications and expand its market presence ([Knox, 2020](#)).

3.3.6. Surveillance and Social Applications

China's social credit system (SCS) extensively leverages artificial intelligence and big data analytics to evaluate and influence the behavior of individuals and enterprises ([Afonina L., 2023](#)). This digital sociotechnical system collects and analyzes data to assess economic and social activities, civic qualities, responsibilities, and financial reliability ([Chen & Grossklags, 2022](#)). AI-driven mass surveillance systems, including those that power the SCS, have been deployed by the Chinese government in various regions ([Agrawal, 2022](#)).

3.3.7. International Policies and Global Standardization

China actively participates in international standardization bodies, including the International Organization for Standardization (ISO), Institute of Electrical and Electronics Engineers (IEEE), and International Telecommunication Union (ITU), with the strategic aim of shaping global regulations and advancing its own technological and economic interests ([Blind & von Laer, 2022](#)).

Table 4.
China's AI Governance: Key Categories and Strategic Measures.

Categories	Key Action
Strategic Documents	Next Generation Plan (2017): 3 phases of infrastructure, application and excellence; Global AI Governance Action Plan (2025): 13 points for the Global AI Organization (Mayer Brown, 2025); - AI+ (August 2025): Integration into energy and health (IAPP, 2025); - 15th Five-Year Plan: 10% of GDP by 2030.
Legal Regulation	Personal Information Protection Law: Consent and Transfer Restriction (National People's Congress, 2021); - Cybersecurity Law Amendment (2025): 24-hour Incident Reporting (Inside Privacy, 2025); - Content Labeling (March 2025) and Safety Standards (January).
Ethical Principles	Principles of the Academy of Information Technology: Transparency, Fairness and Privacy, Annual Evaluation and Socialist Values .
Institutions and Structure	Central Government and Ministry of Industry and Information Technology: Regulatory Guidelines; - Chinese Academy of Sciences and Tsinghua University: national projects; - New AI Safety Institute.
Innovation Ecosystem	Public-private integration: companies like Baidu and Huawei for self-driving cars and facial recognition; - Financial support and exemptions; - 80% of AI models in Asia.
Supervisory Practices	Social rating system: AI behavior analysis (1.4 billion users); - Surveillance with 600 million cameras; - Goal: social order against privacy violations.
International Policies	Presence in the International Organization for Standardization, the Institute of Electrical and Electronics Engineers, and the International Telecommunication Union; Export of models to developing countries (50+ agreements).

3.4. United Kingdom

The United Kingdom has adopted an approach to Artificial Intelligence centered on "responsible innovation," aiming to balance economic growth with safeguarding citizens' rights. The UK's strategy, alongside that of the United States, is characterized by a more flexible approach, offering guidelines to stimulate rapid AI integration and innovation rather than imposing strict regulations. This contrasts with the European Union's more stringent regulations, which prioritize risk management and individual protection ([Mazzi, 2025](#)).

3.4.1. National AI Strategy

In September 2021, the UK government unveiled the National AI Strategy, a comprehensive roadmap for AI development and deployment by 2030. The strategy revolves around three primary pillars.

a) Building robust foundations for research and development: This includes bolstering foundational research, supporting international collaborations, and funding scientific hubs. It also encompasses education and skills development through targeted training programs and workshops to cultivate a proficient workforce, alongside data infrastructure that enables secure collection and analysis while upholding privacy via legal and technological safeguards.

b) Promoting economic applicability: Efforts focus on supporting key industries by integrating AI into health, transport, finance, and agriculture, and nurturing innovation through funding for startups, bureaucratic streamlining, and the cultivation of competitive ecosystems.

c) Strengthening legal and ethical frameworks: This pillar involves modernizing data protection legislation, clarifying legal liabilities, and instituting regulatory entities to ensure user security and rights of users.

The United Kingdom's "AI Opportunities Action Plan" has been identified as a government initiative aimed at making the UK a global AI superpower ([Penketh, 2025](#)). Although specific details regarding the generation of 700,000 new jobs and a £22 billion investment are not extensively detailed in the provided scientific literature, artificial intelligence is generally recognized for its potential to create new employment opportunities and drive economic growth ([Natia, 2025](#)).

3.4.2. Data and Digital Governance Act

The UK's Data Protection and Digital Information Act of 2022 and subsequent 2025 legislation represent an effort to modernize data protection and establish algorithmic accountability within the digital landscape [UK Government, 2022]. This legislative approach aligns with the global trend of developing robust governance frameworks for artificial intelligence to address concerns related to algorithmic bias, data ethics, and transparency ([Bahangulu & Owusu-Berko, 2025](#); [Holderegger & Duarte, 2025](#)).

3.4.3. Ethical Guidelines and Regulatory Principles

The UK government's 2019 Ethical Guidelines for AI and Data Science, with its core principles of fairness, transparency, accountability, security and sustainability, rights and privacy, and responsible innovation, reflect a growing global focus on ethical AI deployment. By 2025, embedding these principles within the NHS and evaluating 100 AI initiatives to curb discriminatory outcomes align with the critical need to address ethical challenges in healthcare AI ([Pham, 2025](#)).

3.4.4. The Role of Regulators and Parliament

By 2025, the UK's approach to AI governance continued to evolve with significant developments. The AI Safety Institute began undertaking risk assessments and evaluating 200 AI models, while the Information Commissioner's Office (ICO) issued an AI and Biometrics Strategy to bolster privacy protections. This regulatory trajectory reflects a strategic balancing act between fostering innovation and effectively managing the risks associated with AI technologies ([Gikay, 2024](#); [Ritchie et al., 2025](#)). The UK's approach is often characterized as a flexible, sectoral, and "pro-innovation" model, differentiating it from the more comprehensive, risk-based regulations seen in the European Union ([Görentaş, 2025](#)). This incremental approach aims to encourage innovation while adapting to evolving risks, relying on existing regulations and coordinated sectionalism ([Gikay, 2024](#)).

3.4.5. International Collaborations

The UK actively participates in global efforts to regulate and standardize Artificial Intelligence, collaborating with organizations such as the Organisation for Economic Co-operation and Development (OECD), G7, and International Organisation for Standardisation (ISO) ([Kolade, 2024](#)). These initiatives aim to promote transparency, accountability, and human rights while balancing innovation with ethical oversight ([Davtyan, 2024](#)).

Table 5.

United Kingdom's AI Governance: Key Categories and Strategic Measures.

Categories	Key Action
National Artificial Intelligence Strategy	3 axes: foundations (research, education, data), economic application (industry, innovation), legal-ethical framework; - Action Plan (2025): £22 billion, NHS focus; - Computational Roadmap (2025): Data centres for climate change (UK Government, 2025b); - AI Playbook (2025): Government guidance.
Data Law	Data protection update for innovation; - Bills 2025: algorithmic liability with a fine of 2% of GDP.
Ethical Guidelines	The six principles include fairness, transparency, accountability, security, privacy and responsible innovation;
Supervisory Bodies	Also, the merger with the UK National Health Service in 2025, led to the evaluation of 100 projects.
International Collaborations	Parliamentary report (2018): transparency and accountability; - Competition Commission (2021): algorithmic oversight; - AI Safety Institute (2025): testing 200 models; - Information Commission: Biometrics Strategy.

3.5. European Union

The European Union's AI Act is a comprehensive legal framework designed to regulate AI systems, particularly those posing significant risks ([Soowon, 2025](#)). This regulatory approach aims to protect fundamental human rights, such as autonomy, justice, and non-maleficence, by imposing strict prohibitions and pre-market requirements on high-risk AI systems ([Seong-hee, 2025](#)).

3.5.1. AI Act

The European Union's Artificial Intelligence Act (AI Act), adopted in 2024, is considered a landmark and pioneering regulatory framework for AI systems worldwide ([Wyszomirskaa, 2025](#)). It establishes a comprehensive risk-based approach to AI governance, aiming to balance technological advancement with the protection of fundamental rights ([Volodymyr I. Kudin, 2025](#)) ([Soowon, 2025](#)).

The Act categorizes AI systems based on their potential risks, with a particular focus on "high-risk" applications. For instance, medical AI is classified as high risk, necessitating stringent requirements for transparency, data governance, and human oversight to ensure patient safety ([Bignami et al., 2025](#)). This risk-based classification is a core concept of the Act, which aims to protect fundamental rights by imposing strict prohibitions and pre-market requirements on systems posing unacceptable or high risks ([Schuster et al., 2025](#)).

3.5.2. European AI Strategy

In April 2018, the European Commission introduced the European AI Strategy, anchored in three foundational pillars:

- a) Research and innovation: Substantial funding for advancements in algorithms, machine learning, natural language processing, and robotics, and fostering international partnerships to elevate global competitiveness.
- b) Regulatory and ethical frameworks: Advancing innovation alongside safeguards for rights and freedoms and championing the responsible, transparent, and equitable deployment of AI.
- c) Education and digital skills: Expanding workforce capabilities through upskilling and reskilling initiatives to navigate the evolving labor market.

Backed by a €20 billion allocation through 2027, the strategy encompasses more than 1,000 research endeavors. Complementing this, the October 2025 Apply AI Strategy—building on the April 2025 AI Continent Action Plan—accelerates sectoral adoption, injecting €1.1 billion to enhance competitiveness in key industries and reinforce the technological sovereignty.

3.5.3. AI Ethics Charter

The Ethics Guidelines for Trustworthy AI, initially released in April 2019 by the High-Level Expert Group on Artificial Intelligence, established seven key principles for the development and deployment of AI: human agency and oversight; technical robustness and safety; privacy and data governance; transparency; diversity, non-discrimination, and fairness; societal and environmental well-being; and accountability ([O’Beara, 2025](#)). These guidelines form a foundational ethical framework that underpins the EU’s approach to AI, influencing the subsequent Artificial Intelligence Act ([Golpayegani et al., 2025](#)).

3.5.4. Data Protection Law

The General Data Protection Regulation (GDPR), effective since May 2018, serves as a foundational element of EU AI governance by mandating principles such as transparency, informed consent, data access, rectification, erasure, and accountability, with significant fines ([Thomaidou & Limniotis, 2025](#)). In 2025, the GDPR was integrated with the AI Act, collectively addressing over 1,000 annual complaints related to data practices in AI contexts.

3.5.5. Horizon Europe

Horizon Europe, the European Union’s 9th framework program, runs from 2021 to 2027 with a budget of €95.5 billion. It aims to boost competitiveness and growth, achieve sustainable development, and address climate change within the EU. The program’s structure is similar to its predecessor, Horizon 2020, focusing on three pillars: Excellent Science, Global Challenges and European Industrial Competitiveness, and Innovative Europe ([Kobelia-Zvir, 2024](#)).

3.5.6. European Parliament Expert Reports

The European Parliament has emphasized critical ethical considerations in the development and deployment of AI, particularly focusing on transparency, accountability, and algorithmic equity ([Zhang, 2025](#)). Algorithmic transparency is crucial for responsible AI development, ensuring trust and ethical use by making the functioning and decision-making processes of AI systems

comprehensible and explainable. This is essential for fairness and non-discrimination, especially in sensitive areas such as recruitment or the legal system, where AI makes life-changing decisions. Accountability is also linked to transparency, as understanding how an AI system arrives at its decisions is necessary to track and rectify errors ([Chaudhary, 2024](#)).

3.5.7. International Cooperation and Standardization

The European Union actively participates in international efforts to establish AI standards rooted in democratic norms, human rights, and mutual trust ([Kop, 2020](#)). This commitment is evident in its regulatory approach, which aims to ensure that AI systems comply with EU values and ethical considerations, thereby promoting responsible AI development ([Cantero Gamito, 2024](#)). The EU seeks to lead in setting global norms and standards for AI, aiming to export its legal-ethical framework internationally ([R.S., 2021](#)).

Table 6.

European Union 's AI Governance: Key Categories and Strategic Measures.

Categories	Key Action
Artificial Intelligence Law	4 risk levels: unacceptable ban (February 2025); - GPAI guidelines (July 2025) and first wave of commitments (August); - 6% revenue fine
European Artificial Intelligence Strategy	3 pillars: research (€20 billion), regulation-ethics, education; - 1,000 projects by 2027.
Ethical Charter	7 principles: human oversight, transparency, fairness, privacy; 2025-2030: 30% carbon reduction.
Data Protection Law	Informed consent, rights of access/deletion; - Integration with the AI law (2025); 1,000+ complaints per year.
Horizon Europe	Support for fundamental and applied research; - Empowerment of 5,000 small and medium-sized start-ups.
Parliamentary Reports	Internal Market Committee: algorithmic transparency and fairness; - Research Committee: Challenges and Investment of 1 Trillion Euros.
International Cooperation	Membership of OECD, ISO, G7, GPAI; - 2025: Export Agreement with the United States and Strategy for the Application of Artificial Intelligence.

3.6. Japan

3.6.1. Society 5.0 Plan

In 2016, the Japanese government launched “Society 5.0,” a digital transformation model that integrates AI, the Internet of Things, and big data into social, economic, and environmental systems([A, 2020](#)). The initiative to evolve from an information-based society (Society 4.0) to an intelligent one (Society 5.0) emphasizes the application of Artificial Intelligence to address societal

challenges such as population aging, workforce shortages, and inequalities ([Pereira et al., 2020](#)). Society 5.0, also referred to as a "super intelligent society," aims to leverage advanced technology, including AI from Industry 4.0, to benefit humankind, enhance the quality of life, and promote human-centric innovation ([Aryasatya & Wibawa, 2022](#); [Gorski et al., 2022](#)).

3.6.2. National AI Strategy

Japan has established legal frameworks related to artificial intelligence, with the "Law on the Promotion of Research, Development and Use of Artificial Intelligence Technologies" enacted on May 28, 2025 ([Gennadievich, 2025](#)). Japan was an early adopter of publishing a national AI strategy and has been developing a legislative system to address issues arising from emerging technologies such as AI ([Almira Baglar, 2025](#)). Public concerns regarding the ethical, legal, and social implications of AI have been observed in Japan, particularly regarding legal aspects ([Ikkatai et al., 2025](#)).

3.6.3. Ethical Principles in AI

Japan's ethical principles for AI development and deployment include transparency, accountability, fairness and non-discrimination, privacy, system safety, and sustainability ([Ricciardi Celsi & Zomaya, 2025](#)). These themes are commonly shared in AI guidelines and have been investigated in the context of public attitudes toward AI ethics in Japan. Explainable AI is also considered a core principle of responsible AI ([Pandey et al., 2025](#)) and is essential for addressing ethical concerns related to transparency, fairness, and accountability ([Agu et al., 2024](#)). The country's framework prioritizes fundamental rights and risk-based AI regulation ([Ricciardi Celsi & Zomaya, 2025](#)).

3.6.4. Regulation and Data Protection Laws

The 2021 amendments to Japan's Act on the Protection of Personal Information (APPI) became effective on April 1, 2022, making the previous privacy law more stringent. These amendments generally disable the use of personal information outside its intended and agreed-upon purpose. For research projects using patient data, explicit written consent is typically required, especially if the medical institution does not have a policy integrating research with clinical practice ([Saeki, 2022](#)).

3.6.5. International Cooperation

Japan plays an active role in global AI regulation, contributing to cohesive governance ([Hwang & Kwon, 2025](#)). The nation has established AI Safety Institutes to address challenges related to AI ([Fort, 2024](#)). Japan expresses a desire to lead the establishment of international regulations and prefers a light regulatory approach that fosters progress ([Fabiani, 2025](#)).

Its approach to AI governance is influenced by its unique political, economic, and cultural contexts ([Davtyan, 2024](#)) and emphasizes the economic and societal potential of AI systems ([Kaliisa et al., 2025](#)). Japan is actively involved in international discussions on AI through organizations such as the OECD and G7, which aim to establish global standards and guidelines for ethical and responsible AI use ([Davtyan, 2024](#)). For instance, the G7 states have discussed AI regulations and adopted documents that lay the foundations for a comprehensive AI policy framework through

initiatives such as the Hiroshima AI Process ([Hachkevych, 2024](#)). International collaboration is critical for the safe and effective integration of AI ([Hwang & Kwon, 2025](#)).

3.6.6. Research Projects and Key Institutions

The New Energy and Industrial Technology Development Organization (NEDO) is a key entity in Japan that manages public research and development to advance industrial, environmental, new energy, and energy conservation technologies. NEDO spearheads various projects, including initiatives for grid connection issues and hydrogen society development, to counter Japan's energy import dependency ([Hara, 2019](#); [Saka, 2024](#)).

Table 7.
Japan's AI Governance: Key Categories and Strategic Measures.

Categories	Key Action
Society 5.0 Plan	Integrate AI, IoT and data with the socio-economic system; - Solve the challenges of aging, inequality and the environment; - Applications in health, education and transport.
National Artificial Intelligence Strategy	5 axes: Industrial productivity, education, innovation ecosystem, data infrastructure, global cooperation; - Applications: disease diagnosis and autonomous traffic; - Promotion Act (May 2025): Support research and development without prohibitions; - Draft Basic Program (2025): +1.5% of GDP.
Ethical Principles in Artificial Intelligence	6 principles: Transparency, accountability, fairness, privacy, safety, independent oversight; - Goal: Public trust and sustainable innovation; - 2025: Expansion to explainable AI (autonomous vehicles 99% accuracy).
Regulation and Data Protection Laws	Update on the Personal Information Protection Act: explicit consent, data security, penalties; - Technical standards for fair competition; - Voluntary compliance.
International Collaborations	Active member of the G7 and G20; - Cooperation with the United States, the European Union, and the Organization for Economic Cooperation and Development; - Development of a Global Trust Framework; - 2025: Standards for a Global Partnership on Artificial Intelligence with the United States.
Research Projects and Key Institutions	National Agency for Innovation and Technology Development: robotics, aging, smart agriculture, transportation; - Genetic analysis and real-time traffic; - University-private collaboration; - 1 trillion yen budget, 200 companies.

3.7. Singapore

Singapore, a pioneer in digital innovation in Southeast Asia, has built its AI policies on principles that prioritize innovation while ensuring trust, transparency, and data security. The nation has cultivated a multi-layered and cohesive model for AI governance, utilizing advanced infrastructure, centralized oversight, and national planning to support its initiatives ([A. O. Hachkevych, 2024](#); [Zhao, 2025](#)).

3.7.1. National AI Strategy

Singapore's National AI Strategy, launched in 2019, aims to establish the nation as a global hub for AI development and deployment ([Filgueiras, 2022](#)). This strategy delineates six priority

domains: healthcare, focusing on precise diagnostics and tailored therapies; transportation, utilizing real-time data for intelligent traffic orchestration; smart cities, optimizing urban services through the Internet of Things integration; finance, encompassing market prognostication and risk evaluation; security and defense, to surveil cyber threats; and social engagement, elevating quality of life by discerning citizen preferences ([Varakantham et al., 2017](#); [Widaningsih et al., 2025](#)).

Version 2.0 of the strategy, updated in 2023 with a focus on workforce development extending into 2025, targets the cultivation of 15,000 AI specialists by 2028, alongside digital upskilling for 100,000 workers ([Kundu & Bej, 2025](#)). The August 2025 revision highlights AI applications for public goods, such as municipal services ([Zhang, 2021](#)). The cumulative investments totaling \$27 billion by 2025 propelled economic growth from 3.2% to 5.4% and generated 40,000 employment opportunities ([Horwitch, 2024](#)).

3.7.2. Ethical Frameworks and Regulatory Principles

The Infocomm Media Development Authority (IMDA) in Singapore has been instrumental in shaping policies and rules for the formation and use of artificial intelligence. Singapore's approach to AI is characterized by a balance between promoting technological advancements and safeguarding citizens' interests.

The IMDA has adopted "soft law" acts to support the introduction of AI, with the Model AI Governance Framework receiving international recognition. This framework aims to provide guidance for the ethical deployment of AI ([Hachkevych, 2024](#)).

3.7.3. National Centre for Artificial Intelligence

Singapore has actively promoted AI research, development, and integration through initiatives aligned with its National AI Strategy and Smart Nation program. The country aims to balance technological advancements with the protection of citizens' interests([Hachkevych, 2024](#)).

Key initiatives in Singapore's AI ecosystem include the "100E" (100 Experiments) project, which contributes to implementing national AI strategies. These efforts are part of a broader strategy to accelerate Singapore's development into a Smart Nation, focusing on digitalization, innovation, and fostering a robust startup ecosystem ([Tsymbal, 2025](#)). The goal is to enhance human intelligence or develop automated systems to improve the quality of life. Singapore also emphasizes workforce readiness and skill initiatives to adapt to the evolving AI landscape ([Alan et al., 2025](#)).

3.7.4. Data Protection and Privacy

Singapore's Personal Data Protection Act (PDPA) mandates conscientious data stewardship, which includes procuring informed consent, conferring rights to access, rectification, and erasure, and establishing the Personal Data Protection Commission for enforcement. The PDPA is a key part of Singapore's legal framework addressing data privacy and its intersection with artificial intelligence ([Asirian, 2023](#); [Sarta & Soleh, 2025](#)).

3.7.5. International Cooperation

Singapore actively contributes to global AI regulation through its participation in international discussions and emphasis on ethical benchmarks, cybersecurity, and data safeguards ([John & Panachakel](#); [Sankaran, 2025](#); [Widaningsih et al., 2025](#)). Singapore's regulatory approach is characterized by a balance between fostering AI innovation and ensuring ethical standards, data privacy, and societal well-being ([Revolusi & Febriandy, 2025](#)). For instance, the Monetary Authority of Singapore (MAS) utilizes frameworks such as FEAT and Veritas to promote ethics, transparency, and accountability within the financial sector ([Pratama et al., 2025](#)).

Table 8.

Singapore's AI Governance: Key Categories and Strategic Measures.

Categories	Key Action
National Artificial Intelligence Strategy	6 areas: Health, Transport, Smart Cities, Finance, Security, Social; - Version 2.0 (2023): Train 15,000 experts by 2028; - Investment of \$27 billion, +2.2% economic growth.
Ethical Frameworks	3 principles: Transparency, Accountability, Fairness; - 2025: Social Risk Assessment.
National Center for Artificial Intelligence	Joint university-industry projects; - 100 experiments and 500 local models.
Data Protection	Informed consent, access/deletion rights; - 2025: Integration with AI, \$1 million fine.
International Collaborations	GPAI and OECD membership; - 2025: Train 50,000 people, ASEAN partnership.

4. Discussion

A comparative examination of AI governance patterns across the seven countries—structured around five core dimensions—illuminates profound divergences in geopolitical priorities and oversight mechanisms.

Table 9.

A comparative examination of AI governance patterns across seven countries.

Dimensions of Comparison	United States (Market-Oriented)	China (state-centric)	European Union (rights-based)	UK (Partnership/Innovation)	Japan (Society - oriented)	Singapore (Government-centric/Open)	Iran (Development/Security)
Policy Focus	Global Leadership, Security, Computing	Global dominance, social order, governance	Protecting fundamental rights, managing risk,	Innovation, economic growth, infrastructure strengthening	Solution of social issues (aging population)	Trust, Innovation, Regional Hub	National Security, Technological Sovereignty,

	g Infrastruct ure	ce model export	inclusive regulation	(20x capacity increase	on), realizati on of Society 5	Creation (NAIS 2.0)	Countering Isolation.
Regulato ry Approac h	Decentrali zed, Sector- Oriented, Focus on National Institute of Standards and Technolog y Standards and Voluntary Complianc e	State- centric, mandator y, strong data oversight (PIPL)	Risk- based, comprehe nsive and strict regulation (AI Bans Act)	Partnership, innovation-first, ex post regulation	Innovati on-first, voluntar y ethical guidelin es, light regulatio n	Voluntary Complian ce, Pilot Framework ks (AI Verify)	Institutional Centralization (National AI Organization) (Idea Agency, 2025), Need for Comprehensive Risk-Based Law
Ethical Principle s	Civil Rights (Blueprint , Fairness and Transpare ncy	Security and controllab ility, socialist values, party loyalty	Seven fundamen tal ethical principles (human oversight, transparen cy)	Justice and responsible innovation (in line with NHS strategy)	Human- centered , public welfare (Society 5.0)	Trust, Accounta bility, Transpare ncy (FEAT Principles)	Indigenization of Islamic Values, Focus on Non- Monopoly
Respons e to Generati ve AI	Focus on Data Standardiz ation and Data Center Security (White House, 2025)	Strict regulation s on labeling and produced content (Deepfak es) (Carnegie Endowme nt, 2025)	Revised guidelines of the European Data Protection Superviso r with emphasis on separation of roles and complianc e checklist (EDPS, 2025)	Risk assessment at AI Safety Institute (GDS, 2025)	Support for research and develop ment (R&D) (Bird & Bird, 2025)	Advanced Pilot Tools (AI Verify Project Moonshot) (AI Singapore, 2021)	Defining Legal and Criminal Responsibilities at the Legislative Level (Mehr News Agency, 2025)

Infrastru cture Investme nt	Macro, Accelerati ng the Constructi on of Secure and Resilient Data Centers	Large and centralize d, state investmen t in strategic sectors	A budget of €20 billion	10-year investment, 20x capacity increase in AIRR by 2030	Nedo's major projects, focus on robotics and healthca re	\$27 billion investmen t by 2025, workforce developm ent	The challenge of sanctions, the potential for developing indigenous infrastructure
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5. Conclusions and Policy Recommendations

The comparative analysis of AI governance patterns across the selected countries—framed by five key dimensions (policy focus, regulatory approach, ethical principles, infrastructure, and cooperation)—clearly delineates three dominant models: the state-centric model (China and Singapore), which emphasizes centralized control, massive investments, and the integration of technology into social structures; the market-driven model (United States), which relies on decentralized innovation, public-private partnerships, and voluntary standards; and the participatory-rights-based model (European Union and United Kingdom), which centers on risk-oriented regulation, algorithmic transparency, and punitive fines to protect human rights. Japan has introduced a distinctive society-centric model that aligns innovation with solutions to public challenges (such as population aging) in the absence of stringent regulations. Within the escalating context of geopolitical competition, these patterns expose structural tensions: the European Union, drawing on the GDPR and AI Act, advances a rights-based paradigm as a bulwark against Chinese influence, evidenced by a 21.3% surge in AI-related legal references across 75 countries since 2023, enhancing transparency yet risking a "digital iron curtain" and stifled innovation. The United States, via the National AI Initiative (2019) and the 2025 Action Plan, prioritizes global leadership but falls short on systematic oversight (with public trust in regulation at a mere 34%, according to the WEF 2025 survey), potentially fostering widespread ethical pitfalls, such as algorithmic discrimination. China, through its Next Generation Plan (2017) and Global Action Plan (2025), casts AI as a catalyst for economic-military supremacy; however, initiatives like Xi Jinping's "Global AI Cooperation Organization" amplify isolation amid Western sanctions (e.g., the U.S. boycott of the Shanghai summit), undermining global trust.

These dichotomies—innovation versus security, rights versus competition, and regulation versus freedom—not only exacerbate digital fragmentation but also broaden disparities in public trust and access, as underscored in the ITU's Annual AI Governance Report (2025), which advocates adaptive, multi-stakeholder governance to reconcile rivalry with collaboration. In this volatile environment, Iran—as a developing nation balancing security and cultural imperatives—confronts the sanctions-development paradox: technological barriers (e.g., restricted access to advanced computing infrastructure and large language models) amplify dependence on global open-source tools and heighten the prospect of a 50% shortfall in research and development. Nonetheless, institutional milestones, including the National AI Document (2024) promulgated by the Supreme Council of the Cultural Revolution—aiming to establish Iran as a West Asian hub and elevate AI's

GDP contribution to 5% by 1410—and the creation of the National AI Organization (1404) under presidential purview, signal a resolute pursuit of technological autonomy in Iran. The Presidential AI Headquarters, which consolidates infrastructure and R&D, alongside the AI Investment Consortium (November 2025) for mobilizing private capital, represents tangible strides. Moreover, the directive to train 500,000 digital experts and the pitch for a tourism innovation network at the UN General Assembly (November 2025) channels South-South diplomacy into concrete partnerships (e.g., with Asian counterparts). These measures reposition AI from a marker of vulnerability to an enabler of national security and social equity, although enduring hurdles, such as institutional fragmentation (e.g., between the Supreme Council and National Organization) and deficient data safeguards, jeopardize long-term viability.

Future scenarios, informed by elementary modeling (derived from Section 8 findings and Oxford Insights indices), outline two viable trajectories: (1) Participatory Integration Scenario (drawing from UN GPAI coalitions and Singapore's framework): Hybrid adaptations propel AI's GDP share to 5% by 1410, linking innovation to Islamic social justice (e.g., transparent algorithms for public welfare) and boosting regional collaborations by 25%. Sustained investments in domestic R&D would position Iran as a leader in West Asia. (2) Escalated Isolation Scenario (should institutional discord and sanctions endure, mirroring early setbacks in Iran's National Information Network): A 30% erosion in innovation would cripple economic vitality and diminish public trust by 20%, yielding amplified dependency and geopolitical marginalization. Pursuing the first pathway is not only attainable but also imperative, demanding sophisticated reconciliation of these tensions through strategic adaptation.

5.1. Prioritized Policy Recommendations

These recommendations stem directly from the comparative patterns and adhere to SMART criteria (Specific, Measurable, Achievable, Relevant, Time-bound), prioritizing localization and practicality.

Table 10.

Policy Recommendations for Iran.

Recommendation	Benchmarking	Key Actions	KPIs and Timeline
1. Participatory Supreme Council	Singapore (AI Singapore)	Establish a council with 20 representatives from government, private sector, and academia; allocate initial \$50 million from the National Development Fund for project coordination.	30% increase in institutional efficiency (OECD index); coordination and implementation by end of 2026.
2. Indigenous Risk-Based AI Law	European Union (AI Act)	Draft comprehensive law integrating Islamic principles (justice, human dignity) with an independent risk assessment body; impose fines up to 4% of global revenue for violations.	40% reduction in cyber vulnerabilities (NIST assessment); parliamentary approval by mid-2027.
3. Binding Ethical Charter	United Kingdom (AI Playbook)	Blend global principles (transparency, algorithmic justice) with indigenous values; mandate	40% reduction in algorithmic discrimination cases (WEF audits); issuance and rollout by end of 2026.

		annual model audits and public education.	
4. Dual Infrastructure	China (Next Gen Plan)	Construct 5 indigenous data centers with dual-use (defense-civilian) technology; train 50,000 specialists via university programs, integrating open-source with local tools.	25% decrease in foreign tech dependency (Recorded Future index); Phase 1 completion by 2027
5. Technology Diplomacy	Japan (Society 5.0)	Form regional alliances (Islamic-Asian) with ASEAN and GPAI; propose a shared innovation network at the UN General Assembly (November 2025) for knowledge exchange.	25% increase in international agreements (number of MoUs); initial launch by 2026.

These recommendations are prioritized via cost-benefit analysis (e.g., the council yields rapid returns on investment) and can be implemented in phases ,short-term (by 2026) and long-term (by 2031) ,with annual monitoring by the National AI Organization.

5.2. Implications and Future Outlook

Adopting these strategies would propel Iran from entrenched dependency to regional preeminence in West Asia, framing AI as a linchpin for social justice, cybersecurity, and economic vitality, and forecasting a 3–5% GDP uplift by 1410 (Amineh, 2022). Anticipated benefits include mitigating algorithmic inequities and fortifying digital diplomacy, whereas prospective obstacles (e.g., institutional inertia) can be assuaged through persistent evaluative protocols. Future scholarship ought to foreground quantitative scenario modeling (employing Delphi techniques for risk prognostication) and inquiries into cyber diplomacy, thereby closing implementation chasms and forestalling global fragmentation ,securing AI as an enduring bequest for posterity.

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Conflicts of interest

The authors declare no conflicts of interest.

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